Definition and Types of Intestinal Failure

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Intestinal Failure - Definitions

Reduction in functioning gut mass below the minimum amount necessary for adequate digestion and absorption of nutrients

*Fleming CR and Remington M 1981*

Reduced intestinal absorption so that macronutrient and / or water and electrolyte supplements are needed to maintain health and / or growth.

*Nightingale JMD 2001*

The reduction of gut function below the minimum necessary for the absorption of macronutrients and / or water and electrolytes, such that intravenous supplementation is required to maintain health and / or growth

*Pironi L et al 2014*
Intestinal Failure

Reduced intestinal absorption causing malnutrition and/or dehydration
**Intestinal Failure**

**Problem**

**Consequences**

- Undernutrition
- Dehydration

Absorption ↓
- Short
- Non-functioning
- Obstructed
- Leaking
- Mucosal disease

**Treatment**

- Nutrition
- Water and salt

Undernutrition +/− Dehydration
Fluid Balance Problems – only!
How do you assess the severity of intestinal failure?
Citrulline

Severity of Intestinal Failure

**Nutrition**

- **Severe**: Parenteral
- **Moderate**: Enteral
- **Mild**: Oral supplements, dietary adjustments

**Water / Electrolyte**

- **Severe**: Parenteral
- **Moderate**: Enteral
- **Mild**: Oral glucose / saline, sodium chloride
What are the causes of intestinal failure?
INTESTINAL FAILURE
Specialist IF and HPN services (adult) definition no 12

ACUTE Type 2 Medium-term

Dysfunction

Fistula / Obstruction

Enteritis Ileus

Infection Chemotherapy

Type 1 Short-term

CHRONIC

Short bowel Gut bypass Dysfunction

Jejunum-colon Jejunostomy

Enteritis Dysmotility

Irradiation Crohn’s disease

Type 3 Long-term
INTESTINAL DYSMOTILITY

Obstruction
- Narcotic Bowel Syndrome

Opiates
- Anorexia nervosa
- IBS

Psychosocial
- SMA syndrome

Undernutrition
- IBS

Myopathy
- Primary: Hollow visceral myopathy
- Secondary: Systemic sclerosis, Ehlers-Danlos Syndrome, Amyloid, Irradiation, Muscular diseases

Neuropathy
- Primary: Hirschsprung’s
- Secondary: Neurological diseases, Paraneoplastic (Thymoma), MNGIE, Drugs
Severe Intestinal Failure in 117 In-patients


\( n \) (%)

**Short term - Type 1**

- Ileus \( 17 \) (15)
- Chemotherapy / GVHD \( 12 \) (10)
- HIV \( 4 \) (3)

**Medium term - Type 2**

- Fistula / anastomotic leak \( 35 \) (30)
- Small bowel obstruction \( 28 \) (24)

**Long term - Type 3**

- High output stoma / short bowel \( 18 \) (15)
- Other \( 3 \) (3)
The Lennard - Jones Intestinal Failure Unit
St Mark’s Hospital

Dedicated ward of 20 beds.
Funded by NHS England (nationally commissioned service)
Reasons for Referral to an Intestinal Failure Unit

- Surgical Complications
- Crohn's Disease
- Ischaemia
Aetiology of New Patients Admitted to Intestinal Failure Units 2014 - 15

- **Crohn's disease**
- **Mesenteric vascular complications**
- **Motility disorders**
- **Radiation enteritis**
- **Scleroderma**
- **Familial polyposis**
- **Malignancy**
- **Other**

**Salford** and **St Mark's**
Typical Acute Intestinal Failure Patient (Type 1 – Short-term)

5 - 14 days post laparotomy
Increasing oedema (albumin 15 g/l)
High nasogastric aspirates
Post Operative Dysmotility ("Ileus")

- Fluid / electrolytes - excess
- Sepsis
- Drugs - opiates
- Surgical techniques
Salt / Water Balance after Surgery


Colon cancer resections

Normal / Surgical (n=10)
> 3 L water and 154 mmol Na / 24 hr

Restricted / Medical (n=10)
< 2 L water and 77 mmol Na / 24 hr
# Salt / Water Balance after Surgery

*Lobo DN et al. Lancet 2002;359:1812-8*

<table>
<thead>
<tr>
<th></th>
<th>Normal Surgical</th>
<th>Restricted Medical</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight change (kg - day 2)</td>
<td>+ 3</td>
<td>0</td>
<td>0.0001</td>
</tr>
<tr>
<td>Gastric emptying (day 4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquid T 50% (min)</td>
<td>110</td>
<td>74</td>
<td>0.017</td>
</tr>
<tr>
<td>Solid T 50% (min)</td>
<td>175</td>
<td>73</td>
<td>0.028</td>
</tr>
<tr>
<td>Flatus (day)</td>
<td>4</td>
<td>3</td>
<td>0.001</td>
</tr>
<tr>
<td>Stool (day)</td>
<td>7</td>
<td>4</td>
<td>0.001</td>
</tr>
<tr>
<td>Solid food (day)</td>
<td>7</td>
<td>4</td>
<td>0.002</td>
</tr>
<tr>
<td>Complications</td>
<td>7</td>
<td>1</td>
<td>0.01</td>
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<tr>
<td>Hospital stay (days)</td>
<td>9</td>
<td>6</td>
<td>0.001</td>
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</table>
Typical Acute Intestinal Failure Patient (Type 2 – Medium-term)

0 - 6 months post laparotomy
Enterocutaneous fistula / wound dehiscence
Typical Chronic Intestinal Failure Patients (Type 3 – Long-term) Short Bowel

Jejunum-colon

Jejunostomy
What is the normal small bowel length?
Small Bowel Length

275 - 850 cm
Chronic Intestinal Failure - Short Bowel
Jejunum-colon

Previous bowel resections
Weight loss and diarrhoea (steatorrhoea)
Chronic Intestinal Failure - Short Bowel
Jejunostomy

Previous bowel resections
Ileostomy diarrhoea
dehydration + / - hypomagnesaemia
Small Bowel Length and Long-term Nutrition / Fluid


<table>
<thead>
<tr>
<th>Jejunum (cm)</th>
<th>Nutrition</th>
<th>Fluid</th>
<th>Nutrition</th>
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</thead>
<tbody>
<tr>
<td>0 - 50</td>
<td>Parenteral</td>
<td>Saline</td>
<td>Parenteral</td>
</tr>
<tr>
<td>51 - 100</td>
<td>Parenteral *</td>
<td>Saline</td>
<td>Oral / Enteral</td>
</tr>
<tr>
<td>101 - 150</td>
<td>Oral / Enteral</td>
<td>OGS</td>
<td>None</td>
</tr>
<tr>
<td>151 - 200</td>
<td>None</td>
<td>OGS</td>
<td>None</td>
</tr>
</tbody>
</table>

OGS: Oral (or enteral) glucose / saline solution

*: at 85 - 100 cm may need parenteral saline only
Summary - Intestinal Failure

1. Reduced gut absorption
   Causes dehydration +/- malnutrition
   Need macronutrients +/- water/electrolytes

2. Short (1), medium (2) and long term (3)

3. Short bowel – jejunum-colon or jejunostomy
Intestinal Failure

Edited by Jeremy Nightingale

Guidelines for management of patients with a short bowel

Nightingale JMD 2001: ISBN 1 900 151 936

Nightingale JMD and Woodward JM. Gut 2006; 55 (suppl IV)